

What is claimed is:

- 1                   1.     A storage management service system, comprising:  
2                   a storage on demand (SoD) center system computer;  
3                   a storage subsystem; and  
4                   a host computer, said host computer, said storage subsystem, and said SoD  
5 center system computer interconnected by a communications network; said host computer  
6 comprising a software agent, said software agent providing an interface between said SoD  
7 center system computer and an operating system resident on said host computer; and  
8 wherein  
9                   said SoD center system computer receives input of an SoD demand, sends  
10 said demand to an SoD resource manager, which manages storage resources of said  
11 storage subsystem; and wherein said SoD resource manager receives said demand from  
12 said SoD center system computer, and thereupon updates a device management table and  
13 an I/O port management table, in which a current status of at least one of a plurality of  
14 resources is recorded, and to which said SoD resource manager refers when managing  
15 said at least one of a plurality of resources, and sends a management result to the SoD  
16 center system computer; and wherein  
17                   said SoD center system computer receives said management result from  
18 said SoD resource manager, and thereupon stores said management result.
- 1                   2.     The system of claim 1, wherein if said demand requires an I/O path  
2 setting to be updated, said SoD center system computer sends an I/O path setting request  
3 to said software agent running in said host computer; and wherein said software agent  
4 receives said I/O path setting request from said SOD center system computer, and  
5 thereupon requests said operating system to update an I/O path setting table based upon  
6 said I/O path setting request, and receives an update result from said operating system,  
7 and thereupon sends a setting result to said SoD center system computer, and wherein  
8 said SoD center system computer receives said setting result from said software agent,  
9 and thereupon stores said setting result.
- 1                   3.     The system of claim 1, wherein said host computer and said storage  
2 subsystem are connected directly by physical and logical connections made between at

3 least one of a plurality of host I/O controllers and at least one of a plurality of subsystem  
4 I/O ports.

1 4. The system of claim 1, wherein said host computer and said storage  
2 subsystem are connected by a network switch between at least one of a plurality of host  
3 I/O controllers and at least one of a plurality of subsystem I/O ports.

1 5. The system of claim 4, wherein said network switch comprises a  
2 fibre channel network switch.

1 6. A storage apparatus comprising:  
2 a memory;  
3 at least one of a plurality of devices that store information;  
4 at least one of a plurality of I/O ports providing an interface to said at least  
5 one of a plurality of devices that store information;  
6 a device management table, in which a status of said at least one of a  
7 plurality of devices that store information is stored, and an I/O port management table, in  
8 which a status of said at least one of a plurality of I/O ports is stored, said device  
9 management table and said I/O port management table being disposed in said memory;  
10 and  
11 a storage resource management processor; wherein  
12 said storage management processor receives a demand for storage  
13 resources, and thereupon updates said device management table and said I/O port  
14 management table, and sends a management result responsive to said demand for storage  
15 resources; and wherein updates to at least one of a plurality of paths connecting to storage  
16 resources allocated from said at least one of a plurality of devices that store information  
17 are automatically defined to an operating system of a user machine by a remotable  
18 software agent.

1 7. The apparatus of claim 6, said at least one of a plurality of devices  
2 that store information comprising at least one of magnetic disk, an optical disk, a  
3 magnetic-optical disk, and a semiconductor memory.

1 8. The apparatus of claim 6, further comprising a communications  
2 interface to a network, said storage management processor receiving said demand for  
3 storage resources over said network.

1                   9.     The apparatus of claim 6, further comprising a fibre channel  
2 switch, said fibre channel switch providing capability to connect to at least one of a  
3 plurality of host computers.

1                   10.    A method for configuring a host computer to access resources in a  
2 removable storage subsystem, said host computer, said removable storage subsystem, and  
3 a center system computer interconnected by a communication network, said method  
4 comprising:  
5                   receiving at said host computer an I/O path setting request from said center  
6 system computer, said I/O path setting request comprising information about resources in  
7 said removable storage subsystem allocated for use by said host computer;  
8                   requesting an operating system resident in said host computer to update an  
9 I/O path setting table based upon said I/O path setting request;  
10                  receiving an update result from said operating system; and  
11                  sending a setting result to said center system computer based upon said  
12 update result.

1                   11.    The method of claim 10, wherein updating said I/O path setting  
2 table comprises: storing an indication that a particular I/O port in said storage subsystem  
3 is accessible to a particular host I/O controller.

1                   12.    The method of claim 10, further comprising:  
2                   receiving at said center system computer an input of a demand for storage  
3 resources;  
4                   determining whether sufficient resources exist in order to meet said  
5 demand;  
6                   sending said demand for storage resources to said storage subsystem, if  
7 sufficient resources were determined to exist;  
8                   receiving from said storage subsystem a management result, said  
9 management result indicating whether storage resources have been successfully allocated  
10 in accordance with said demand;  
11                  storing said management result;  
12                  determining whether said demand includes an I/O path setting request;

13 sending said I/O path setting request to said host computer, if said demand  
14 included an I/O path setting request;  
15 receiving said setting result from said host computer; and  
16 storing said setting result.

1 13. The method of claim 12, further comprising:  
2 receiving said demand for storage resources at said storage subsystem;  
3 determining whether said demand includes a command to make at least  
4 one of a plurality of installed devices available;  
5 updating a device management table, if said demand includes a command  
6 to make at least one of a plurality of installed devices available;  
7 updating an I/O port management table; and  
8 sending a resource management result to said center computer system.

1 14. The method of claim 13, wherein updating a device management  
2 table comprises: storing an indication that a particular device is usable.

1 15. The method of claim 13, wherein updating a I/O port management  
2 table comprises: storing an indication that a particular I/O port is usable.

1 16. The method of claim 13, further comprising:  
2 receiving at said storage subsystem an I/O command to access storage  
3 resources from said host computer;  
4 determining whether storage resources requested by said I/O command are  
5 usable;  
6 performing said I/O command, if said storage resources requested by said  
7 I/O command are usable, otherwise rejecting said I/O command; and  
8 sending an I/O result to said host computer.

1 17. The method of claim 16, wherein determining whether storage  
2 resources requested by said I/O command are usable comprises:  
3 searching said device management table to determine whether devices  
4 requested in said I/O command are usable.

1 18. The method of claim 17, wherein determining whether storage  
2 resources requested by said I/O command are usable further comprises:

3                    searching said I/O port management table to determine whether I/O ports  
4 requested in said I/O command are usable and whether devices requested in said I/O  
5 command are accessible via I/O ports requested in said I/O command.

1                    19.     A computer program product for configuring a host computer to  
2 access resources in a remotable storage subsystem, said host computer, said remotable  
3 storage subsystem, and a center system computer interconnected by a communication  
4 network, said computer program product comprising:  
5                    code that receives at said host computer an I/O path setting request from  
6 said center system computer, said I/O path setting request comprising information about  
7 resources in said remotable storage subsystem allocated for use by said host computer;  
8                    code that requests an operating system resident in said host computer to  
9 update an I/O path setting table based upon said I/O path setting request;  
10                   code that receives an update result from said operating system;  
11                   code that sends a setting result to said center system computer based upon  
12 said update result; and  
13                   a computer readable storage medium for holding the codes.

1                    20.     The computer program product of claim 19, further comprising:  
2                    code that receives at said center system computer an input of a demand for  
3 storage resources;  
4                    code that determines whether sufficient resources exist in order to meet  
5 said demand;  
6                    code that sends said demand for storage resources to said storage  
7 subsystem, if sufficient resources are determined to exist;  
8                    code that receives from said storage subsystem a management result, said  
9 management result indicating whether storage resources have been successfully allocated  
10 in accordance with said demand;  
11                   code that stores said management result;  
12                   code that determines whether said demand includes an I/O path setting  
13 request;  
14                   code that sends said I/O path setting request to said host computer, if said  
15 demand includes an I/O path setting request;  
16                   code that receives said setting result from said host computer; and

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code that stores said setting result.

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